Mathematics Toolkit: Grade 8 Objective 1.B.2.b

Standard 1.0 Knowledge of Algebra, Patterns, and Functions

Topic B. Expressions, Equations, and Inequalities

Indicator 2. Identify, write, solve, and apply equations and inequalities

Objective b. Solve for the unknown in a linear equation

Assessment Limits:

Use one unknown no more than 3 times on one side and up to three operations (same or different but only one division) and rational numbers (-2000 to 2000)

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Objective 1.B.2.b Tools

Higher Order Thinking Skills

Mathematics Grade 8 Objective 1.B.2.b Assessment Limit 1

Level 1: Knowledge/Comprehension

Solve the equation $-3t + 14 = 5$.

Sample correct response:

$$-3t + 14 = 5$$
$$-14 \quad -14$$
$$-3t = -9$$
$$\frac{-3t}{-3} = \frac{-9}{-3}$$
$$t = 3$$

Level 2: Application/Analysis

Solve the equation $3t = 4(t - 1)$. As you solve the equation, provide a mathematical justification for each step in the solution.

Sample correct response:

$3t = 4(t-1)$

$3t = 4t-4$ Distributive property

$4 = t$ Addition property of equality

(added $-3t$ and $+4$ to both sides of the equation)

Level 3: Synthesis/Evaluation

Explain the steps needed to solve the equation $2x + 50 - 14x = 398$ for x. Is there more than one way to solve the equation?

Sample correct response: Combine like variable terms, getting $-12x + 50 = 398$. Then subtract 50 from both sides of the equation to get $-12x = 348$. Next, divide both sides of the equation by -12 to get $x = -29$.

Sample correct response: Subtract 50 from both sides. Combine like terms. Next, divide both sides of the equation by -12 to get $x = -29$.

Fractional equations like the one below can be simplified by multiplying both sides of the equation by the denominator of the fraction, in this case 2.

$$\frac{5x-3}{2} = 6$$

Solve the equation using this method. Then solve the equation, distributing the factor of $\frac{1}{2}$ across each term on the left side of the equation. Do you get the same results? What are the advantages of using the first method?

Sample correct response:
Method 1:

$$\frac{5x-3}{2}=6$$
$$5x-3=12$$
$$5x=15$$
$$x=3$$

Method 2:

$$\frac{5x-3}{2}=6$$
$$\frac{5}{2}x-\frac{3}{2}=6$$
$$\frac{5}{2}x=\frac{15}{2}$$
$$\frac{2}{5}\bullet\frac{5}{2}x=\frac{2}{5}\bullet\frac{15}{2}$$
$$x=3$$

Yes, you get the same results. The advantage of using the first method is that you are not operating with fractions. Once both sides of the equation are multiplied by 2, all the coefficients on both sides are integers.